

1.3

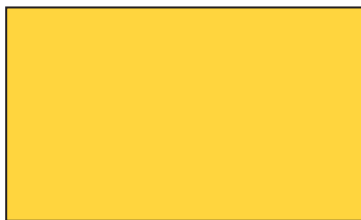
Writing an Equation

You used tables and graphs to represent relationships between length and area for rectangles with fixed perimeters. In this problem, you will write equations for these relationships.

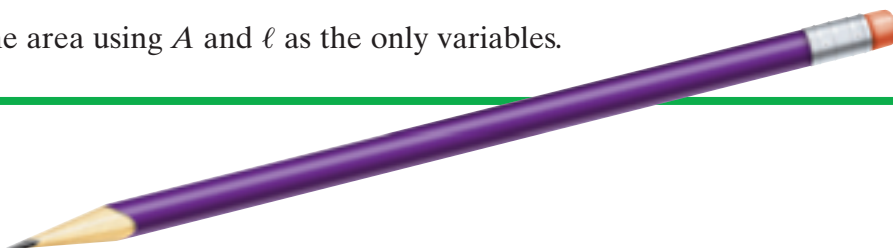
Getting Ready for Problem 1.3

You know that the formula for the area A of a rectangle with length ℓ and width w is $A = \ell w$ and the formula for perimeter P is $P = 2\ell + 2w$.

The rectangle below has a perimeter of 20 meters and a length of ℓ meters.



- Use the fixed perimeter to express the width of this rectangle in terms of ℓ .
- Write an equation for the area using A and ℓ as the only variables.



Problem 1.3 Writing an Equation

- A.** Consider rectangles with a perimeter of 60 meters.
1. Sketch a rectangle to represent this situation. Label one side ℓ . Express the width in terms of ℓ .
 2. Write an equation for the area A in terms of ℓ .
 3. Use a calculator to make a table for your equation. Use your table to estimate the maximum area. What dimensions correspond to this area?
 4. Use a calculator or data from your table to help you sketch a graph of the relationship between length and area.
 5. How can you use your graph to find the maximum area possible? How does your graph show the length that corresponds to the maximum area?
- B.** The equation for the areas of rectangles with a certain fixed perimeter is $A = \ell(35 - \ell)$, where ℓ is the length in meters.
1. Draw a rectangle to represent this situation. Label one side ℓ . Label the other sides in terms of ℓ .
 2. Make a table showing the length, width, and area for lengths of 0, 5, 10, 15, 20, 25, 30, and 35 meters. What patterns do you see?
 3. Describe the graph of this equation.
 4. What is the maximum area? What dimensions correspond to this maximum area? Explain.
 5. Describe two ways you could find the fixed perimeter. What is the perimeter?
- C.** Suppose you know the perimeter of a rectangle. How can you write an equation for the area in terms of the length of a side?
- D.** Study the graphs, tables, and equations for areas of rectangles with fixed perimeters. Which representation is most useful for finding the maximum area? Which is most useful for finding the fixed perimeter?



ACE Homework starts on page 11.

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